

REMARKS

1. § 103(a) Rejection of Claims 1, 3-11, and 14-26

Claims 1, 3-11, and 14-26 have been rejected as being obvious over Gorrington et al. (U.S. 3,894,938) in view of WO 98/01515 to Moureaux. Reconsideration and withdrawal of this rejection are respectfully requested in view of the following remarks.

The Gorrington et al. patent discloses a process for catalytically dewaxing a gas oil feed having a boiling range of from about 400 °F to 900 °F and containing sulfur and/or nitrogen. *See* column 2, lines 14-15, 51-56; column 3, line 53 – column 4, line 29; and claim 1. An important aspect of the invention of the Gorrington et al. patent is the particular sequence of the processing steps, *see* column 2, lines 48-56; and column 3, lines 35-46; and, further, it is preferred for the gas oil feed of the inventive process to have a total sulfur and nitrogen content of at least 0.1 wt. percent and 10 ppm, respectively. *See* column 2, lines 55-59. The Gorrington et al. patent notes that the conventional thought among those skilled in the art is that sulfur containing gas oils should be catalytically hydrodesulfurized prior to dewaxing. *See* column 1, line 66 – column 2, line 7; and column 2, lines 14-18. But, in the Gorrington et al process, the sulfur containing gas oil first undergoes a catalytic dewaxing step followed by desulfurization. *See* column 2, lines 48-56; column 3, lines 12-19; column 4, lines 25-26; and claim 1.

The dewaxing catalyst of the Gorrington et al. process includes ZSM-5 type zeolite having incorporated therein a hydrogen transfer functional component. *See* column 2, lines 59-61, and 64-67. The hydrogen transfer functional component includes nickel, palladium, or platinum and is present in the dewaxing catalyst in the range of from about 0.5 to 5 weight percent of the total weight of the dewaxing catalyst. *See* column 2, line 64 – column 3, line 2. The dewaxing catalyst may be of the matrix type and contains from about 5 to 95 weight percent ZSM-5 type zeolite in the total catalyst matrix with the matrix material being alumina, silica, silica-alumina or other similar matrix materials. *See* column 3, lines 7-11.

The Moureaux publication discloses a process for the preparation of lubricating base oils that necessarily includes two reaction stages with an intermediate separation step between the two reaction stages. *See* Abstract; page 1, lines 2-8; page 5, lines 7-25; page 9, lines 30-32; page 10, line 31-page 11, line 18; page 17, line 31-page 18, line 4; claim 1; and Figures 1 and 2. The

first reaction stage is a hydrotreating step used to remove sulfur and nitrogen from a hydrocarbon feed using a catalyst comprising both a Group VIB metal component and a non-noble Group VIII metal component supported on a refractory oxide carrier. *See* page 5, lines 10-14; page 6, line 14-page 7, line 20. The importance of the sulfur and nitrogen removal reaction step is emphasized. *See* page 9, line 1-page 10, line 3. It is noted that the noble-metal based catalyst used in the second reaction step is sensitive to poisoning by sulfur and nitrogen. *See* page 9, lines 9-15.

The product from the first reaction step is to be separated into a gaseous fraction and a liquid fraction. *See* page 9, lines 30-32. The first reaction step is to be operated so as to provide the liquid fraction having less than 1000 ppmw sulfur and less than 50 ppmw nitrogen. *See* page 9, lines 1-7; page 9, line 32-page 10, line 3. But, it is preferred for these concentrations to be lower such as less than 500 ppmw sulfur and less than 30 ppmw nitrogen. *Ibid.*

The second reaction stage may provide the two functions of hydrofinishing (hydrogenation of aromatics) and hydrodewaxing (hydroisomerization), or a single function of hydrofinishing alone, configured in a variety of ways. *See* page 10, line 31-page 11, line 33. In the case where the second reaction stage provides for the two functions, the hydrodewaxing function precedes the hydrofinishing function. *See* page 11, lines 22-29; page 14, line 4-page 16, line 5. Thus, in accordance with the invention, the liquid fraction undergoes a catalytic hydrofinishing treatment after a catalytic hydrodewaxing treatment, but the catalytic hydrofinishing treatment may be conducted when there is no prior catalytic hydrodewaxing treatment.

The hydrofinishing catalyst comprises a noble metal component, such as platinum and palladium, supported on an amorphous refractory oxide carrier. *See* page 12, line 1-page 13, line 3. It is important for the carrier to be an amorphous refractory oxide, with it being understood that the refractory oxides exclude those of zeolitic nature, such as aluminosilicates and silica-aluminophosphates. *See* page 12, lines 21-25.

The dewaxing catalyst may be selected from those known in the art, such as, dewaxing catalysts comprising a noble metal (platinum or palladium) supported on an intermediate pore size zeolitic material. *See* page 14, lines 13-27. Another class of dewaxing catalyst comprises a

noble metal component supported on a surface deactivated aluminosilicate. *See* page 14, lines 27-31.

The cited references may not be combined in the way the Examiner has combined them; since, there is no motivation presented in the references themselves to suggest such a combination. *See* MPEP § 2143.01. Instead, the references themselves actually teach against the Examiner's suggested modification of the primary reference of Gorrington et al. by the secondary reference of Moureaux. Moreover, the comparative examples in the Applicants' specification show the improvements in its dewaxing process, which uses a dewaxing catalyst comprising a Group VIII metal component, dealuminated aluminosilicate zeolite, and a low acidity refractory oxide binder material that is essentially free of alumina, as compared to a dewaxing process that uses a conventional ZSM-5 type dewaxing catalyst.

The Examiner notes that the feed to be processed by the Gorrington et al process is different from the feed recited in the Applicants' claimed invention, and he notes that the dewaxing catalyst of the Gorrington et al process is different from the dewaxing catalyst of the Applicants' claimed process. But, the Examiner argues that it is obvious to modify the Gorrington et al process to utilize the Applicants' claimed feed; because, the feeds are, allegedly, chemically and physically similar. The Examiner, thus, expresses the erroneous conclusion that the Gorrington et al. process would be expected to effectively treat the Applicants' claimed feed in the same way as the Gorrington et al. process treats its feed.

The Examiner also argues that it is obvious to modify the Gorrington et al. process to replace its use of ZSM-5 type dewaxing catalyst with the use of a dewaxing catalyst such as the dealuminated zeolite catalyst disclosed by the Moureaux publication. The Examiner argues that this modification is obvious because the Moureaux catalyst is effective for the desired reaction of the Gorrington et al. patent. The Examiner presents this argument in spite of the fact that the Moureaux publication actually teaches against the effectiveness of its taught catalyst in a process such as that taught by the Gorrington et al. patent and in spite of the fact that without the teachings of the Applicants' application one skilled in the art would not have known that the Moureaux catalyst would be effective in the process as claimed by the Applicants.

Without citing any authority or reference to support his assumption, the Examiner makes the conclusory statement that the Applicants' claimed feed is chemically and physically similar to

the feeds taught by the Gorrington et al. patent. The Examiner, however, is required to support such a technical conclusion with the citation of art, which he has not done. In any event, the Applicants' specification and the Gorrington et al. patent both suggest that their respective feeds are indeed different. The Applicants' claimed feed is a vacuum distillate, which has a boiling range between 300 °C (572 °F) and 620 °C (1148 °F). *See* the specification at page 4, lines 22-35 and claim 1. The feed of the Gorrington et al. patent, on the other hand, is gas oil boiling in the range of from 400 °F to 900 °F and includes such petroleum fractions as kerosene, diesel fuel and heating fuel. *See* column 1, lines 6-10; and column 2, lines 14-19. Implicit in the language of the Gorrington et al. patent is that the noted gas oil, having the specified boiling range, has different properties from other petroleum fractions.

The Examiner further presents the unsupported conclusion that it would be expected that the Gorrington et al. process could effectively treat the Applicants' claimed feedstock. But, there is absolutely no suggestion within the Gorrington et al. patent that a feedstock other than the one specifically mentioned by Gorrington et al. may be suitably treated by its process. Furthermore, the Moureaux publication actually suggests that its dewaxing catalyst would not be effective in the type of process taught by the Gorrington et al. patent. The Moureaux publication speaks to the importance of its desulfurization step for reducing the sulfur and nitrogen content of its feedstock prior to the dewaxing step. *See* page 9. The Moureaux publication further states that it is known that noble metal-based catalysts are sensitive to and quickly poisoned by sulphur and nitrogen feed contaminants. *See* page 9. The process disclosed in the Moureaux publication requires the sulfur and nitrogen content of its feedstock to be substantially reduced prior to the dewaxing step. *See* page 9.

As for the teachings within the Applicant's patent specification, comparative examples are presented that demonstrate that the Applicants' claimed process performs unexpectedly better than a process similar to the one taught by the Gorrington et al. patent. The Applicants' examples present comparisons of dewaxing performance in the treatment of a sulfur-containing gas oil when using conventional gas oil dewaxing catalyst and when using the inventive dealuminated ZSM-5 catalyst. *See* the specification at pages 14-23. The conventional catalyst used in the Applicants' comparative examples is similar to the catalyst described in the Gorrington et al. patent, and it contains untreated ZSM-5, alumina binder, and nickel. *See* the specification at page 17,

lines 5-15. The catalyst of the inventive process contains dealuminated ZSM-5, silica binder and a Group VIII metal. *See* the specification at pages 14-18.

Considering the teachings of the Moureaux publication that the feed to be treated using its catalyst should have a low sulfur concentration, and considering the teachings of the Applicants' patent specification that conventional dewaxing catalysts similar to those taught by the Goring et al. patent do not perform as well as Applicants' claimed catalyst in the dewaxing of a sulfur-containing feedstock, it is clear that Applicants' claimed invention is unobvious over the art cited by the Examiner.

2. § 103(a) Rejection of Claim 12

Claim 12 has been rejected as being obvious over Goring et al. (U.S. 3,894,938) in view of WO 98/01515 to Moureaux in further view of Ward (U.S. 4,743,354). Reconsideration and withdrawal of this rejection are respectfully requested in view of the following remarks.

Summaries of the relevant Moureaux and Goring et al. teachings are presented above.

The Ward patent is directed to a process for converting a waxy hydrocarbon feedstock. The process includes a dewaxing step followed by a hydrocracking step. *See* Abstract; column 3, lines 1-9; column 8, lines 28-39; and claims. The preferred feedstock for producing the lube oil base is a full range shale oil or shale oil fraction that has been catalytically hydrotreated. *See* column 4, lines 22-25. A preferred embodiment of the Ward process requires the entire effluent from the hydrodewaxing reactor to be passed to a hydrocracker reactor. *See* column 8, lines 28-39.

The arguments presented above with respect to the first § 103(a) rejection also apply with respect to this rejection.

The Examiner argues that it is obvious to modify the teachings of the Goring et al. patent and the Moureaux publication in such a manner that the dewaxed effluent of the described processes is hydrocracked; since, the Ward patent teaches the hydrocracking of a dewaxing unit effluent. The cited references, however, cannot be combined in the manner suggested by the Examiner; because, such a combination would actually change the described processes in a way that conflicts with the teachings of the references. *See* MPEP § 2143.01.

The Moureaux publication teaches a three-step process including a first step for hydrotreating a feed followed by a separation step followed by the dewaxing of the liquid product

from the separation step. The process of the Gorrington et al. patent, on the other hand, is a two-step process in which the feed first undergoes a dewaxing step followed by a hydrotreating step. The process steps of the two processes cannot be reversed or the processes would be changed from those taught within the individual references. There is no real way in which the Ward process steps of dewaxing followed by hydrocracking may be used to modify the two process arrangements of the Moureaux and Gorrington et al. references; because, any modification would change the processes from those taught by the references. Claim 12 is directed to a process that takes its dewaxed product and subjects it to a hydrotreatment step followed by a hydrocracking step. This particular arrangement is not obtainable by any proper combination of the three cited references.


In view of the above remarks, it is respectfully asserted that claim 12 is patentable over the cited prior art.

3. Conclusion

In view of the above remarks and distinctions, the Applicants respectfully assert the claims now pending in the application are patentable over the cited prior art. Early allowance of claims 1, 3-12, and 14-26 is therefore respectfully requested.

Respectfully submitted,

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